Race-Specific Provider Performance: Evidence from Black Lives Matter Protests *

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Abstract

This paper explores whether hospital performance for Black patients is malleable and how it shapes racial disparities in healthcare. We leverage the onset of local Black Lives Matter (BLM) protests as an external shock to providers' racial awareness and societal pressure. We find that hospitals exposed to BLM protests experienced significant reductions in 30-day risk-adjusted mortality among Black patients admitted for acute myocardial infarction, with no detectable changes observed for non-Black patients. The reduction in mortality persists among emergency admissions and among "non-exposed" patients treated in exposed hospitals prior to any BLM activity in their home cities, suggesting that the observed mortality decline is primarily driven by changes on the supply side, rather than by patient selection or demand-side factors. These effects are more pronounced following protests with more involved participants and are concentrated in hospitals with lower baseline performance in treating Black patients, as well as in those located in Democratic-leaning counties.

Our results do not necessarily indicate prior discriminatory intent among providers. Rather, salient social events may have heightened providers' attentiveness, leading to improved outcomes for Black patients. In examining the underlying mechanisms, we observe no significant changes in overall resource utilization but do find strong evidence of increased productivity. Notably, enhanced matching between Black patients and higher-productivity attending physicians accounts for approximately one-third of the observed productivity gains, while racial concordance between patients and providers remains unchanged. These results highlight the potential of improving race-specific productivity as a complementary pathway for reducing racial disparities in healthcare delivery.

Keywords: racial disparity, BLM protests, patient mortality, provider productivity

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1 Introduction

Racial disparities in healthcare remain a persistent issue in the U.S., with the Black population experiencing an age-adjusted mortality rate that is 30% higher than that of their White counterpart (Kochanek et al., 2023). These disparities also exist across a wide range of healthcare services, from basic care to the most advanced diagnostic and therapeutic interventions (Nelson, 2002). Prior studies have identified several contributing factors, including disparities in patients' socioeconomic status (Cutler et al., 2006), barriers for patients in accessing high-quality hospitals (Chandra et al., 2024), racial discordance between providers and patients (Alsan et al., 2019), provider discretion (Chandra and Staiger, 2010; Singh and Venkataramani, 2022; Corredor-Waldron et al., 2024; Philip and Ozkaya, 2024), among others. In this paper, we examine the role of race-specific provider performance in shaping racial disparities in healthcare. We present new evidence that, even within a hospital, hospital performance for Black patients is malleable, and that improving this performance can help reduce racial disparities without compromising the care quality of other patient groups.

Race-based social movements provide a unique opportunity for empirically estimating the malleability of race-specific provider performance. Specifically, we study local Black Lives Matter (BLM) protests, a major racial justice movement, as a natural experiment to examine the role of provider performance in addressing racial disparities. BLM protests, first triggered by high-profile police killings of unarmed Black Americans, generated substantial attention to racial justice, reshaped public discourse, and heightened awareness of racial bias (Reny and Newman, 2021; Dunivin et al., 2022; Gethin and Pons, 2024). We hypothesize that BLM protests influence provider behavior toward Black patients.[1] In particular, exposure to BLM protests might enhance providers' racial awareness and amplify societal pressures through public scrutiny, media attention, and societal expectations, thereby altering how providers engage with Black patients and potentially improving health outcomes for Black patients.

We study patients admitted to hospitals with acute myocardial infarction (AMI), more commonly known as heart attack. There are several reasons for choosing this setting. First, AMI is a leading cause of death and imposes a substantial financial burden on patients and payers, with annual costs estimated at $84.9 billion in 2016 dollars (Bishu et al., 2020). Second, there are stark racial disparities in AMI care; for example, Black patients face up to 1.5 times the mortality risk of White patients after cardiac surgeries (Khera et al., 2015). Third, measures for hospital performance, such as 30-day risk-adjusted mortality rate, are well defined and extensively validated in this context (Doyle et al., 2019). Finally, and more importantly for our identification, AMI is an acute condition that typically requires hospitalization and timely medical intervention, highlighting the role of providers, rather than patient preferences, in determining health outcomes (Chandra and Staiger, 2010).

We link comprehensive data on BLM protests to Medicare claims to examine how social movements affect patient outcomes. Our empirical strategy leverages the staggered onset of local BLM

[1] We suspect, and provide evidence, that BLM protests do not simultaneously alter patients' underlying medical risk or preferences regarding hospitals.

protests across U.S. cities between 2014 and 2016. During this period, approximately 700 cities experienced their first BLM protest, which we use to define our set of treated hospitals. Specifically, we construct three calendar-time cohorts based on the year of initial exposure (2014, 2015, or 2016) and designate as controls those hospitals that did not experience a protest until during or after 2020, yet did so by 2021. Employing a stacked difference-in-differences framework, we compare within-hospital changes in the 30-day risk-adjusted mortality between treated and control hospitals. Our identification relies on the assumption that, absent BLM protests, treated and control hospitals would have exhibited parallel trends in their underlying risk-adjusted mortality.

We find that hospitals exposed to BLM protests experienced an immediate reduction of 4.6 percentage points in their 30-day risk-adjusted mortality rate for Black patients. This improvement represents approximately one-fifth of a standard deviation in hospital-level risk-adjusted mortality within our sample. In magnitude, the effect is comparable to moving a Black patient from a hospital at the 25th percentile up to one at the 32nd percentile of the descending hospital mortality ranking. Moreover, the improvement in patient outcomes persists for up to three years following the initial exposure.

Meanwhile, we find no discernible changes in health outcomes for White, Asian, or Non-Black Hispanic (hereafter "Hispanic") patients. In combination, these results offer evidence that hospital performance is race-specific and that the Black-patient-specific performance is malleable. The null effect on non-Black patients suggests that the observed mortality reduction for Black patients is plausibly attributable to BLM protests instead of driven by unobserved factors that might otherwise affect all patients in local markets. Moreover, the absence of spillover effects also highlights an important policy implication: improvements in outcomes for Black patients can be achieved without adversely affecting non-Black patients.

We next present evidence that the observed improvements in health outcomes are primarily driven by supply-side responses, as opposed to demand-side confounds, such as patients' riskiness and preferences. First, we show that patient demographics, risk factors, predicted mortality based on patient characteristics, and the volume of Black patients all remain stable within a given hospital following BLM protests. This finding mitigates concerns that the observed effects are driven by shifts in the underlying health of Black patients or by patient selection into certain hospitals in response to the protests.[2] Second, we observe comparable reductions in mortality among Black patients who were admitted through emergency departments, where patients and their families have little influence over hospital choice or treatment decisions. Finally, we analyze a subsample of "non-exposed" patients who were treated at exposed hospitals prior to any BLM protests occurring in their home cities and therefore should not have responded to BLM protests by themselves. We find largely consistent results among this group of patients, thus further corroborating the argument that the mortality reductions are largely supply-side driven.

To further strengthen our identification, we conduct a series of placebo and permutation tests

[2]Regarding potential changes in population health attributable to BLM-related events, prior research documents poorer mental health among Black adults following police killings of unarmed Black Americans (Bor et al., 2018).

to confirm that our findings capture the causal effect of BLM protests on Black patients' health outcomes. In the placebo analysis, we find the closest match for each treated hospital from the control group and find no significant effects for these "pseudo-treated" hospitals. In the permutation test, we construct a series of "pseudo-treated" groups by randomly assigning fake protest timings to control hospitals and repeatedly re-estimate the model. The actual treatment effect lies at the extreme tail of the distribution for estimated effects from permutation regressions, indicating that the observed effect is highly unlikely to have occurred by chance. Additionally, our results remain robust across a range of alternative specifications, including the difference-in-differences estimator proposed by Callaway and Sant'Anna (2021).

We note that the effect of BLM protests can be unequal for different hospitals in different markets. Through several heterogeneity analyses, we find that mortality reductions are more pronounced following protests with more participants involved. These effects are also concentrated in hospitals with lower baseline performance in treating Black patients and in those located in Democratic-leaning counties.

The fact that we find a reduction in Black patients' mortality rates after BLM protests does not necessarily indicate any discriminatory intent by providers ex ante. Rather, salient external events appear to have prompted greater provider attentiveness, resulting in better outcomes for Black patients. To understand further how hospitals achieve better outcomes for Black patients only, we examine two potential mechanisms: increased resource use and enhanced productivity with the same resources. We find no significant changes in key indicators of resource use, including length of stay; number of tests and exams; surgery rates; Diagnosis-Related Group (DRG) weights; attending physicians' relative value units (RVUs); or post-discharge care, such as being transferred to skilled nursing or rehabilitation facilities. These results suggest that the observed improvements likely reflect improved productivity in treating Black patients, rather than an increase in the intensity of care delivery. Consistent with this interpretation, we document a substantial increase in hospitals' Black-specific total factor productivity, estimated using a patient-level health production function, following Chandra et al. (2016a,b).

Finally, we consider two possible pathways through which productivity gains are realized. The first one is the probability of Black patients being treated by higher-productivity physicians. We show that Black patients are about 6% more likely than before to be treated by higher-productivity physicians, which accounts for approximately one-third of these overall productivity gains. Importantly, matching quality for non-Black patients remains unchanged, indicating that physicians were not operating at capacity constraints, given the relatively small proportion of Black patients.[3] The second pathway is the probability of Black patients being treated by Black physicians. Previous literature has documented the benefits of such racial concordance (e.g., Alsan et al., 2019). However, we find no evidence of increased racial concordance between Black patients and their attending physicians in our context, regardless of the reduction in mortality rates.

[3]Prior to the protests, the quality of physician–patient matching was comparable between Black and non-Black patients, which provides no evidence of preexisting discriminatory assignment.

Our study contributes to the literature examining the underlying causes and potential solutions for racial disparities in healthcare. Such disparities stem from a variety of factors, including social determinants of health (Cutler et al., 2006; Town, 2024), differences in insurance coverage (Yearby, 2011), unequal access to high-quality hospitals (Chandra et al., 2024), and limited racial concordance between minority patients and healthcare providers (Alsan et al., 2019; Ye and Yi, 2023). Within this line of research, our paper is most closely related to Chandra and Staiger (2010), Singh and Venkataramani (2022); Corredor-Waldron et al. (2024), and Philip and Ozkaya (2024), all of which study the role of provider discretion in allocating resources and choosing treatment for Black versus non-Black patients. In contrast, we leverage BLM protests as a race-specific external shock to assess whether provider performance can be improved for Black patients. We also extend the earlier literature by showing that, beyond differences in resource utilization and treatment choices, variation in providers' productivity across patient racial groups also contributes to racial disparities in health outcomes. Our results highlight provider productivity as a distinct and potentially more actionable channel for addressing these disparities. In contrast, interventions targeting the socioeconomic conditions of Black patients tend to operate slowly, while policies redirecting patients to higher-quality hospitals face geographic and logistical constraints, particularly in emergency care. Likewise, initiatives promoting racial concordance are limited by the low representation of Black physicians in the medical workforce.

Our study also contributes to the literature on social movements by examining their impact on the performance of organizations that are not directly connected to those movements. Prior research shows that social movements can heighten public awareness, shift public sentiment, and affect targeted institutions (Madestam et al., 2013; Soule, 2018; Wasow, 2020; Dunivin et al., 2022), while more recent work (Acemoglu et al., 2018; Ba et al., 2023; Luo and Zhang, 2022; Lins et al., 2024) reveals spillover effects of social movements on domains connected with the immediate target(s) of those movements. For example, Acemoglu et al. (2018) find that, Egypt's Arab Spring protests, aimed at challenging political regimes, reduced market valuations of politically connected firms. We extend this literature by exploring how social movements influence *non-connected* institutions. In this vein, our paper complements studies that document the broader impacts of social movements on corporate board diversity (Bogan et al., 2021), credit access (Garcia and Ortega, 2024), venture capital investment in Black-founded startups (Marx et al., 2025), and judicial decision-making in gender-based violence cases (Cai et al., 2025). Related research also shows that social movements shape consumer behavior, including increased crime reporting after #MeToo (Levy and Mattsson, 2023) and heightened participation in collective actions (Bursztyn et al., 2021). We depart from the existing work by examining organizational performance, a dimension rarely studied in the context of social movements, and we leverage the healthcare sector as an ideal setting, where performance is observable, quantifiable, and directly linked to life-and-death outcomes.

The remainder of the paper is structured as follows. Section 2 provides background on the BLM protests. Section 3 describes the data sources and the construction of key variables. Section 4 outlines the empirical strategy. Section 5 presents new evidence on race-specific provider perfor-

mance through the lens of the BLM protests. Section 6 explores the underlying mechanisms for the changes observed, and Section 7 concludes with a discussion of the findings and their policy implications.

2 Background

Social movements are a powerful means of expressing public dissatisfaction and driving institutional changes (Dunivin et al., 2022; Gethin and Pons, 2024; Acemoglu et al., 2018). Notably, the influence of social movements often extends beyond their immediate targets. For example, Acemoglu et al. (2018) show that Egypt's Arab Spring protests, primarily focused on political regime change, led to lower stock market valuations for politically connected firms. Similarly, Luo and Zhang (2022) find that the #MeToo movement, while focused on addressing sexual misconduct, spurred broader changes in the entertainment industry, including increased collaboration between producers and female writers on new projects. However, there is limited evidence regarding the ripple effects that social movements might have on the broader society.

We study social protests as an exogenous shock to healthcare providers, building on evidence that such movements could shift individual perceptions and behaviors. More specifically, we leverage the outbreak of Black Lives Matter (BLM) protests. BLM protests are one of the most prominent contemporary social movements in the United States, focusing on racial justice. After George Zimmerman was acquitted following the shooting death of Trayvon Martin, a Black teenager, in 2013, three activists originated the widespread hashtag #BlackLivesMatter on social media. BLM protests soon followed since 2014, particularly in response to a series of highly publicized police killings of Black Americans. These protests reached global prominence, then, in 2020, following the murder of George Floyd, with an estimated 15 to 26 million participants across the U.S., making it one of the largest protest movements in the nation's history.[4] Despite their scale, over 96% of BLM protests were peaceful, involving no reported injuries or property damage.[5] The non-violent nature of this movement helps to mitigate concerns that healthcare providers' behavior could be influenced by facility damage or safety threats.

Like other social movements, BLM protests have been shown to shift racial attitudes (Mazumder, 2019; Reny and Newman, 2021; Dunivin et al., 2022), and may be even more effective than other movements in doing so (Gethin and Pons, 2024). While BLM protests often center on police violence, they also bring attention to broader issues of racial justice, including the systemic inequality and discrimination that Black Americans face, and they have been documented to elicit responses across a wide range of institutions. For example, Bogan et al. (2021) find that BLM protests after the death of George Floyd led to a 120% increase in the appointment of Black directors on corporate executive boards. Ba et al. (2023) show that policing firms that contracted heavily with the police experienced stock price gains, relative to non-policing firms, after BLM protests. Garcia and Ortega (2024) find that Paycheck Protection Program loan disbursements to Black business owners

[4] https://www.nytimes.com/interactive/2020/07/03/us/george-floyd-protests-crowd-size.html
[5] https://www.wshu.org/news/2020-10-19/uconn-study-at-least-96-of-black-lives-matter-protests-were-peaceful

increased compared to other racial and ethnic groups due to the shift in lenders' racial attitudes following BLM protests.

Given the power of BLM protests to shift racial attitudes and influence decision-making across industries, we hypothesize that these protests can have far-reaching effects on healthcare providers' racial awareness and their care for Black patients. In particular, providers may become more attentive and deliver higher-quality care to Black patients. Because the BLM movement specifically aims to advance the well-being of Black individuals, we conceptualize it as a race-specific shock that is likely to affect health outcomes of Black patients. Leveraging such a race-specific shock allows us to examine the role of race-specific provider performance in contributing to racial disparities in health outcomes and to generate new insights into potential strategies for mitigating these disparities.

3 Data and Measures

3.1 Medicare Claims Data for Heart Attack Patients

We use administrative claims records (MedPAR files) for a 20% random sample of Medicare beneficiaries spanning from 2010 to 2019. We restrict the analytical sample to patients aged 66 to 100, with a principal ICD diagnosis code for heart attack.[6]. We also exclude patients who experienced a prior hospitalization for heart attack within the preceding year.

We then link these hospital admissions to the carrier files (which contain claims for physician services), using unique beneficiary identifiers and inpatient time ranges. This linkage allows us to identify physicians involved in each hospitalization and to construct measures of resource utilization, including: (1) length of stay; (2) number of tests; (3) whether a surgical procedure was performed; (4) diagnosis-related group (DRG) weight; (5) total physician relative value units (RVUs); and (6) whether the patient was discharged to a skilled nursing or rehabilitation facility.

We further merge the admissions data with the Master Beneficiary Summary File (MBSF) using the beneficiary identifiers. The MBSF provides detailed information on patient demographics and chronic conditions, thereby allowing us to identify patient race and perform risk adjustments based on rich patient characteristics. We construct a 30-day mortality indicator for each admission (i.e., death occurring within 30 days of the admission date), using the death date reported in the MBSF; results are similar when defining 30-day mortality based on the discharge date instead.

3.2 BLM Protest Data

Data on BLM protests from July 2014 through December 2021 were obtained from Elephrame, an independent, open-access archive that documents demonstrations based on online news and social media.[7] This dataset has been used as well in prior research that examines BLM protests (e.g., Dunivin et al., 2022; Campbell, 2024; Garcia and Ortega, 2024). For each protest, we observe

[6] Specifically, ICD codes for heart attack start with "410", "I21", or "I22".

[7] See https://elephrame.com/charts/BLM.

its event date, its location at the city level, an estimated number of participants, and a link to at least one media source that reported on the event.

The BLM movement experienced two major waves of protests. The first wave began in the latter half of 2014, following the police killings of Eric Garner in New York City and Michael Brown in Ferguson, Missouri. The second wave emerged in 2020, in response to the murder of George Floyd in Minneapolis, Minnesota. Both waves sparked nationwide demonstrations. Between 2014 and 2016, there were 1,619 protests across 658 cities. Then 3,410 protests occurred across 1,240 cities between 2020 and 2021. Together, these two waves represent approximately 86% of all BLM protests from 2014 to 2021, as well as a comparable proportion of cities that experienced at least one protest during this period. Because our Medicare data extend only through 2019, the analysis in this paper focuses on the first wave of BLM protests.[8]

We next merge the BLM protest data with the Medicare claims data by city. We assume that all hospitals within a city are equally exposed to the focal protest(s). A hospital may be exposed to repeated protests over time, but for the purpose of our analysis, we focus on the timing of the first protest that a hospital (more specifically, its city) experiences.

Among hospitals treating heart attack patients in the merged sample, 651, 61, and 111 hospitals experienced their first protest in 2014, 2015, and 2016, respectively. These three cohorts comprise our treated group. In contrast, 480 hospitals experienced their first protest in 2020 or later and are designated as the control group. A total of 79 hospitals with initial protests occurring between 2017 and 2019 are excluded from the analysis, as they constitute a small portion of the sample and lack an adequately long post-treatment observation window for the event study design, given that the Medicare data end in 2019. Figure 1 presents the geographical distribution of the treated and control hospitals included in our final analysis.

[Figure 1 about here]

3.3 Hospital Performance Measures

Our primary outcome of interest is hospital performance, measured by the 30-day risk-adjusted mortality rate. This metric is widely adopted in both the medical and economics literature as a standard measure of hospital quality in the treatment of heart attack patients (Menees et al., 2013; Myles et al., 2016; Chen, 2021; Mourot, 2025).[9] Essential to our analysis, we allow hospital performance to vary by year and by racial group. Below, we explain how we construct hospital performance for Black patients. We also apply the same approach to White, Asian, and Hispanic patients to calculate group-specific, risk-adjusted mortality rates for each hospital in a given year.

[8] Garcia and Ortega (2024) analyze both the protests following George Floyd's death and earlier demonstrations, finding consistent and comparable effects on Black borrowers' access to credit.

[9] Following CMS guidelines, the 30-day time frame is necessary because outcomes within 30 days of admission can be influenced by hospital care, reflecting both inpatient treatment and hospital-led coordination of post-discharge transitions. CMS also notes that using a 30-day window ensures that variation in lengths of stay does not have an undue influence on mortality rates (see Centers for Medicare & Medicaid Services, 2008, 2013).

In constructing our hospital performance measure, we first calculate the predicted mortality rate for each patient using the following logit model:

$$ln\big(\frac{Pr(D_{ih}=1|\boldsymbol{X_i})}{1-Pr(D_{ih}=1|\boldsymbol{X_i})}\big) = \alpha + \boldsymbol{\beta}\cdot\boldsymbol{X_i} + \epsilon_{ih}, \tag{1}$$

where D_{ih} is the mortality indicator that equals one if patient i in hospital h died within 30 days of admission. $\boldsymbol{X_i}$ is a vector of the patient's demographics and comorbidities, including age, sex, race (Black, White, and others), insurance status (whether dual eligible for Medicare and Medicaid), disability indicator, and diagnoses dummies for any of the 23 conditions.[10]

This model is estimated separately for each year. The fitted values are obtained for each patient in order to form an expected death probability $\hat{p_{ih}}$, which is used to construct a hospital's risk-adjusted mortality rate (RAMR) following Huckman and Pisano (2006), Ghaferi et al. (2009), and Kolstad (2013). Specifically, we first calculate EMR_h^B, the average expected mortality rate of Black patients treated at hospital h for a given year, and OMR_h^B, the average observed mortality rate of Black patients treated at hospital h in that year:

$$EMR_h^B = \frac{\sum_{i=1}^{N_h^B}\hat{p_{ih}}}{N_h^B}, \tag{2}$$

$$OMR_h^B = \frac{\sum_{i=1}^{N_h^B} D_{ih}}{N_h^B}, \tag{3}$$

where N_h^B is the total number of Black patients treated in hospital h for that year. We focus on hospital-year observations with at least two Black heart attack patients.

Then the hospital's Black-specific RAMR is the average observed mortality divided by the average expected mortality for its Black patients, normalized by multiplying the overall average observed mortality rate for Black patients in the sample:

$$RAMR_h^B = \left(\frac{OMR_h^B}{EMR_h^B}\right)\times OMR^B. \tag{4}$$

Intuitively, EMR_h^B is the mortality rate for an average quality hospital with the same Black patient mix as hospital h. $RAMR_h^B$ measures how large or small a hospital's observed Black mortality rate is relative to the average hospital with the same Black patient mix. A hospital is considered to be underperforming for its Black patients, if its observed mortality, OMR_h^B, exceeds

[10] Age groups are 66-69, 70-74, 75-79, 80-84, 85-89, 90-94, and 95-100. Sex groups are male and not male. The 23 comorbidity conditions are: unstable angina, chronic atherosclerosis, respiratory failure, hypertensive heart disease or heart failure, valvular heart disease, arrhythmia, hypertension, stroke, cerebrovascular disease, renal failure disease, dialysis, COPD, pneumonia, diabetes, protein calorie malnutrition, dementia, paralysis and disability, peripheral vascular disease, metastatic cancer, trauma, substance abuse, major psychiatric disorder, and chronic liver disease.

the expected mortality given its Black patient mix, EMR_h^B.

4 Empirical Strategy

Our empirical strategy exploits the staggered outbreak of BLM protests across U.S. cities. To account for potential time-varying treatment effects in a staggered adoption setting, we employ a stacked difference-in-differences design.

Specifically, we restructure the data into event-time cohorts based on the year of a hospital's first exposure to a BLM protest, focusing on the 2014, 2015, and 2016 cohorts. For example, in the 2014 cohort, hospitals located in cities that experienced their *first* BLM protests in 2014 are considered the treated hospitals. The control hospitals are later-treated hospitals that did not experience a protest until after 2019 but did so before the end of 2021.[11] We follow the same approach in constructing the 2015 and 2016 cohorts and append the three cohorts into one dataset.

We first conduct hospital-level analyses to examine the effect of local BLM protests on hospital race-specific performance, measured by a hospital's RAMR for a given racial group. Specifically, we estimate the event-study specification in Equation (5) using the stacked sample separately for Black, White, Asian, and Hispanic patients, and for a non-Black pool combining White, Asian, and Hispanic patients.

$$RAMR_{htc}^r = \sum_{k=-4}^{3} \beta_k \times Treated_{hc} \times \mathbf{1}(t = k) + \boldsymbol{\phi Z_{htc}} + \delta_{tc} + \theta_{hc} + \epsilon_{htc}, \tag{5}$$

where $RAMR_{htc}^r$ denotes the risk-adjusted mortality rate of patients with race r for hospital h in event year t and cohort c. The indicator variable $Treated_{hc}$ equals 1 if hospital h in cohort c is treated. t denotes the cohort specific relative year. $\boldsymbol{Z_{htc}}$ is a vector of time-varying hospital and county characteristics. Hospital characteristics include hospital bed size (logged), patient admission volume (logged), indicators for teaching hospital status and private not-for-profit hospital status, and the shares of patients discharged through Medicare and Medicaid. County-level characteristics include median household income (logged), population (logged), percentage of adult population, percentage of non-White population, percentage of the population with a bachelor's degree or higher, and unemployment rate. δ_{tc} denotes cohort specific event-year fixed effects, and θ_{hc} denotes cohort specific hospital fixed effects. The year immediately preceding the event ($t = -1$) is omitted as the base period. The coefficients of interest are the β_k; they capture whether there exist any differential pre-trends and identify the treatment effects of BLM protests.

Our identification strategy relies on the assumption that, absent the occurrence of BLM protests, the treated and control hospitals would have exhibited parallel trends in RAMR between the pre- and post-event periods. We weight each hospital-year observation by the volume of patients in the relevant racial group, in order to reduce the influence of RAMR estimates based on small patient

[11] The control hospitals for the 2015 and 2016 cohorts are the same as those for the 2014 cohort. In theory, the 2014 (2015) cohort could include as controls the later-treated hospitals that were first exposed to BLM protests in 2018 (2019), though this set is small. Our results remain robust when these additional control hospitals are included.

samples. Results from unweighted regressions are similar. Standard errors are clustered at the hospital level.

While our main analysis is primarily conducted at the hospital level, we also estimate the following patient-level regression, Equation (6), to examine changes in patient outcomes and to explore the underlying mechanisms driving these changes:

$$Y_{ihtc} = \sum_{k=-4}^{3} \beta_k \times Treated_{hc} \times \mathbf{1}(t = k) + \boldsymbol{\gamma} \boldsymbol{X_{it}} + \delta_{tc} + \theta_{hc} + \phi_t^m + \phi_t^d + \epsilon_{ihtc}, \tag{6}$$

where Y_{ihtc} denotes an outcome variable for patient i in hospital h, cohort c, and event year t. To examine changes in health outcomes, we use a patient's 30-day mortality indicator as the outcome variable. Meanwhile, to explore underlying mechanisms, we consider a range of resource use intensity and productivity measures, with detailed information covered in Section 6. $\boldsymbol{X_{it}}$ is the vector of patient characteristics defined in Equation (1). ϕ_t^m and ϕ_t^d are fixed effects for the calendar month and day of the week, respectively.

Table 1 presents summary statistics for our main analytical sample, i.e., hospitals that treated more than one Black patient, including RAMR, measures of resource use, hospital characteristics, and county-level characteristics that were used in the regressions, reported separately by treatment status.

5 Main Results

5.1 The Effect of BLM Protests on Patient Mortality

We present our results graphically, using event study figures, which plot estimated β_k along with their 95% confidence intervals. We first study mortality among Black patients. Note that we drop hospital-year observations that have only one or no Black admissions in a given year. The resulting sample for Black patients has a total of 579 treated hospitals and 207 control hospitals, totaling 5,069 hospital-year observations.

Panel (a) of Figure 2 shows that, prior to BLM protests, treated and control hospitals have witnessed parallel trends in their 30-day RAMR for Black patients. However, immediately after the protests (i.e., $t = 0$), hospitals in exposed areas experienced a 4.6 percentage point reduction in $RAMR_h^B$, which represents about one-fifth of the standard deviation of the $RAMR_h^B$. From another perspective, the magnitude of the effect is equivalent to relocating a Black patient from a hospital at the 25th percentile of quality to one at the 32nd percentile of the hospital quality distribution in treating Black patients.[12] The improvement in Black patient outcomes due to a hospital's initial exposure to the protests lasts at most three years, with subsequent repeated exposures generating additional but much smaller effects.[13]

[12] The hospital quality distribution is ordered in descending RAMR, so higher percentiles correspond to better quality.

[13] The effect from restricting the sample to hospitals treated only in 2014 also persists for three years, although the effects in the second and third post years are slightly smaller than when pooling all hospitals, including those with

[Figure 2 about here]

To facilitate comparison with the literature, we conduct a patient-level analysis using Equation (6). The patient-level regression estimates a treatment effect of a 2.8 percentage point reduction in mortality, which is a 26% decline relative to the baseline mortality rate of 10.6% for Black patients. Appendix Figure A1 presents the corresponding event study plot. The magnitude of the estimated effect in the current study is smaller than the 4.5 percentage point reduction (or 46% decline) in 28-day mortality for veterans aged 65 and older when treated in a U.S. Department of Veterans Affairs hospital versus a private Medicare-financed hospital, as documented in Chan et al. (2023). To some extent, our estimated effect is more comparable to the findings of Doyle Jr et al. (2015), who show that a one–standard-deviation increase in log hospital spending lowers one-year mortality by 3.7 percentage points, or about 10% of the average one-year mortality rate in their sample.[14]

We next assess whether BLM protests affected outcomes for non-Black patients. In contrast to the results observed for Black patients, Panel (b) of Figure 2 shows no discernible change in 30-day risk-adjusted mortality among non-Black patients following BLM protests. These findings have several implications. First, they provide direct evidence of race-specific performance differences within the same providers and indicate that such differences are malleable.

Second, the decline in mortality among Black patients was achieved without an adverse effect on non-Black patients. To assess potential negative spillovers, Appendix Figure B1 shows that the result persists even when restricting to treated hospital-years with an above-median share of Black patients, where spillovers would be most likely to arise. Furthermore, Appendix Figure C1 reports estimates separately for White, Asian, and Hispanic patients; these estimates likewise reveal no detectable effects for any of these groups.

Last and most importantly, these findings reinforce the interpretation that the observed effects were driven by BLM protests aimed at improving the well-being of the Black population. This interpretation is consistent with recent evidence showing that BLM protests meaningfully shift racial attitudes and increase public awareness of racial bias (Reny and Newman, 2021; Dunivin et al., 2022; Gethin and Pons, 2024). It echoes research regarding the impact of BLM protests on other domains, such as studies that show that BLM protests influence the behavior of lenders and the outcome of corporate boards in ways that favor the Black population (Bogan et al., 2021; Garcia and Ortega, 2024).

Robustness Check Appendix Figure A2 shows that our results remain robust when including state-by-year fixed effects to account for state-level concurrent events, such as Medicaid expansion. Appendix Figure A3 demonstrates that the results are highly consistent when excluding treated

repeated treatment in 2015 and 2016. Among the cities first exposed in 2014, 44% (59%) were also exposed again in 2015 (2016).

[14] Given that Black patients face 1.5 times the mortality risk of White patients following cardiac surgeries (Khera et al., 2015), a 26% reduction in Black mortality implies that this ratio narrows from 1.5 to 1.1, effectively closing about 80% of the gap. This magnitude of improvement in racial disparities in mortality is large relative to prior work. For example, Alsan et al. (2019) find that racial concordance between a Black patient and a cardiologist in an outpatient setting reduces the Black-White male gap in cardiovascular mortality by 19 percent.

hospitals located in cities with above-median populations, thereby alleviating concerns that not all hospitals in large cities were exposed to the treatment.[15] Appendix Figure A4 further confirms that the estimated treatment effects are comparable when applying the alternative difference-in-differences estimator proposed by Callaway and Sant'Anna (2021).

Placebo and Permutation Test To further validate that the observed reduction in mortality among Black patients is driven by BLM protests, we conduct two validation exercises. First, we perform a placebo test, following Buchmueller et al. (2016), by substituting the treated hospitals with control hospitals that closely resemble them in observable characteristics, including both hospital- and county-level covariates specified in Equation (5) in Section 4.[16] We then re-estimate Equation (5) as if these matched controls had experienced BLM protests. If our findings were driven by concurrent changes in local social or economic conditions, rather than by the protests themselves, we would expect to observe similar effects among these placebo-treated controls. However, Appendix Figure A5 shows no significant effects for the placebo-treated controls, which suggests that the treatment effect is not likely attributable to unobserved market conditions.

Second, we implement a permutation test, following Abadie et al. (2010) and Buchmueller et al. (2016), and in the spirit of Fisher (1935), to assess how likely it would be to observe our results in the absence of BLM protests. Specifically, we randomly assign each BLM protest status and timing from treated hospitals to control hospitals and re-estimate Equation (5) under these randomized assignments. Appendix Figure A6 presents the event-study estimates based on 100 iterations of this procedure. The placebo and "true" estimates are nearly identical during the pre-treatment period, but in every post-period, the "true" effect falls below nearly all placebo estimates. Together, these validation exercises provide strong evidence that the observed decline in mortality among Black patients is highly unlikely to have occurred in the absence of BLM protests.

5.2 Evidence of a Supply-Side Response

It is important to distinguish whether the observed effects are demand-side or supply-side driven. On the demand side, BLM protests may have heightened awareness among Black patients, potentially influencing their hospital choices or prompting more precautionary health behaviors or self-advocacy. However, we consider a demand-side explanation to be unlikely in this context, given the acute nature of heart attacks and the dominant role of supply-side factors in determining patient outcomes. Furthermore, we provide supporting empirical evidence below that demonstrates that our main findings are, indeed, not attributable to demand-side responses.

First, we emphasize that our analysis of mortality outcomes employs risk adjustment based on a rich set of patient demographics and comorbidities. Our results, therefore, are not likely driven by selection on patient observables. To assess potential patient selection further, we directly test

[15] Results are similarly robust when excluding cities with more than two or three hospitals, or when omitting treated hospitals that are situated more than five miles from the city center, where protests were most likely to occur.

[16] Hospitals are matched using Mahalanobis distance, and the nearest control hospital is selected for each treated hospital.

whether BLM protests influenced Black patients' hospital choices. If such selection had occurred, we would expect to observe shifts in patient demographics, risk profiles, and/or admission volumes following the protests.

To evaluate this, we compute the average predicted mortality, based on individual characteristics, for all Black patients admitted to a given hospital in each year. This measure provides a comprehensive proxy for patient illness severity, and we estimate its response to BLM protests using Equation (5). As illustrated in Figure 3, we find no evidence that BLM protests affected the severity of cases involving Black patients at a hospital, indicating stable patient composition over time. Appendix Figure D1 presents pre- and post-event estimates for individual patient characteristics; it shows no systematic changes following the protests. Likewise, Appendix Figure D2 confirms that the volume of Black patient admissions remained unchanged.

[Figure 3 about here]

Second, we examine a subsample of Black patients admitted through the emergency department (ED). In such urgent cases, opportunities for patient selection are minimal, as patients and their families exert little influence over hospital choice or treatment decisions. As shown in Figure 4, the results reveal a similarly significant reduction in mortality among Black patients in this subsample, thus further suggesting that the observed effects are not driven by patient selection.

[Figure 4 about here]

Last but not the least, we examine cases in which hospitals were exposed to protests while their Black patients were not. Specifically, we estimate the patient-level regression, Equation (6), restricting the sample to Black patients admitted to treated hospitals before any protests occurred in their home cities. Such restriction allows us to retain about 75% of the treated hospitals from our main analysis.

Note that these patients received care in exposed hospitals but traveled from areas not yet exposed; this scenario allows us to isolate the provider-side response. If the treatment effect were primarily demand-driven, we would expect a much weaker or null effect for those "non-exposed" patients. However, Figure 5 shows a comparable reduction in mortality among those patients, suggesting that the observed effect is not likely driven by patient-side responses to BLM protests.[17]

[Figure 5 about here]

Taken together, these results offer strong support that our findings are unlikely to be driven by demand-side factors. Instead, we interpret the estimated improvements in performance as reflecting provider responses to the onset of BLM protests. In Section 6, we investigate the underlying mechanisms for these improvements on the provider side.

[17] The most comparable figure is Appendix Figure A1, which also presents a patient-level analysis but uses the full sample of Black patients.

5.3 Heterogeneity

To investigate potential heterogeneity in the treatment effect, we first examine whether the magnitude of the estimated impact varies with the salience of the protests. We proxy protest salience using the total number of participants across protests in the initial exposure year and classify a protest as salient if its participant count exceeds the 75th percentile (approximately 980 participants).[18] We then estimate Equation (5) separately for hospitals exposed to more-salient versus less-salient protests. Panel (a) of Figure 6 shows that hospitals exposed to more-salient protests exhibit larger reductions in mortality, thus lending support to the interpretation that the observed effects are likely driven by the protests themselves.[19]

We next examine heterogeneity in treatment effects based on hospitals' baseline performance in treating Black patients ($RAMR_h^B$). Hospitals with $RAMR_h^B$ (measured as the average across years before the first protest) below the sample median are classified as high-quality, while those above the median are classified as low-quality. We then estimate Equation (5) separately for the high- and low-baseline quality sub-samples. Panel (b) of Figure 6 presents the results. We find that mortality reductions were more pronounced among hospitals with lower baseline quality, which suggests that quality improvements were primarily concentrated in lower-performing hospitals following BLM protests rather than in hospitals that were performing better for Black patients to begin with.

We further examine heterogeneity in treatment effects by county-level partisanship and political ideology. County-level voting data from the 2012 presidential election are obtained from the MIT Election Data and Science Lab.[20] The 2012 election, being the most recent election preceding the three BLM protest cohorts (2014, 2015, and 2016) and being unaffected by the protests themselves, serves as an appropriate measure of counties' political leanings for our study.

Following Dahl et al. (2022), we classify a county as Democratic-leaning (Republican-leaning) if its 2012 Democratic (Republican) vote share exceeds 50%.[21] We then estimate Equation (5) separately for hospitals in Democratic and Republican leaning counties. As shown in panel (c) of Figure 6, hospitals in Democratic-leaning counties exhibit significant reductions in mortality, whereas those in Republican-leaning counties display no discernible changes. This heterogeneity is consistent with evidence that BLM protests primarily influenced racial attitudes among politically liberal individuals (Dunivin et al., 2022), and it aligns with the broader understanding that the Democratic Party has historically been more receptive to acknowledging and engaging with issues of racial equity and social justice. Collectively, these findings not only reinforce the validity of our identification strategy but also suggest that the effects of BLM protests are shaped by the

[18] Results remain highly consistent when using the average number of participants or normalizing participant counts by city population.

[19] Using Google search intensity at the Designated Market Area level for the keywords "Black Lives Matter" or "BLM" as a proxy for protest salience, we find that the treatment effect is primarily driven by hospitals located in areas with above-median Google search intensity (Appendix Figure A7). Likewise, when measuring hospital proximity to the city center—where protests most likely occurred—Appendix Figure A8 shows that the effect is concentrated among hospitals closer to the city center (with the median distance as the cutoff).

[20] https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/VOQCHQ.

[21] Results remain consistent when using 2016 presidential vote share data or when applying a stricter threshold, such as a 60% vote share cutoff.

surrounding political context.

[Figure 6 about here]

6 Mechanisms

How did hospitals achieve improved health outcomes for Black patients following exposure to BLM protests? One potential mechanism is increased resource utilization, while another involves more efficient use of existing resources, i.e., a productivity improvement.

In this section, we empirically examine both channels. We first demonstrate that the observed reduction in mortality among Black patients primarily reflects a race-specific improvement in productivity, rather than changes in resource utilization. We then investigate two concrete dimensions to characterize this improvement in productivity further.

6.1 Resource Utilization

We begin by examining whether improved outcomes for Black patients might have resulted from increased resource utilization or higher care intensity. Specifically, we analyze changes in length of stay, number of tests, whether a surgery was performed, diagnosis-related group (DRG) weights, attending-physician relative value units (RVUs), and discharge destination. Regarding this latter variable, discharge to a skilled nursing or rehabilitation facility is considered more intense post-discharge care, relative to discharge home. We conduct this analysis at the patient level following Equation (6), with the relative year indicators replaced by a single post-period indicator. The results, presented in Figure 7, show no statistically significant changes in any of the resource utilization measures among Black patients. These findings suggest that the observed reductions in mortality are unlikely to be driven by increased resource use.

[Figure 7 about here]

6.2 Productivity

To explore the productivity channel, we first measure a hospital's total factor productivity (TFP), following the methodology used by Chandra et al. (2016a,b). Specifically, we consider a patient-level log health production function:

$$ln(S_{iht}) = ln(A_{ht}) + \boldsymbol{\beta} \cdot \boldsymbol{X_{it}} + \theta \cdot ln(Input_{iht}) + \epsilon_{ih}, \tag{7}$$

where S_{iht} is the number of days that patient i survives within 365 days following admission to hospital h in year t. $\boldsymbol{X_{it}}$ include the same set of patient demographics and comorbidities as in Equation (1).

Following Chandra et al. (2016a,b), we measure input as the sum of DRG weights during the index stay, which captures the expected resources needed to treat a patient based on their medical

conditions and procedures. In an alternative specification, we use the total Medicare payments and obtain similar results. Because both Medicare payments and DRG weights capture expected rather than actual resource use, we also consider total length of stay and number of tests as proxies for realized input. The results are robust across all specifications.[22]

A hospital's TFP is captured by $ln(A_{ht})$, the hospital-year fixed effect, which is essentially the risk- and resource-adjusted patient survival. We estimate Equation (7) using the sample of Black patients, resulting in hospital-year, Black-specific productivity measures. This productivity measure captures a hospital's efficiency in converting inputs into health outcomes for Black patients. Then we use Equation (5) to estimate whether exposure to a BLM protest led to productivity improvement. Figure 8 shows a significant 16% increase in Black-specific productivity, lasting three years after the protests.

[Figure 8 about here]

6.3 Two Pathways

A hospital's TFP reflects all elements that contribute to its efficiency in producing patient health. Using the patient-level regression specified in Equation (6), we examine two possible pathways that capture efficiency gains conditional on a given level of care intensity, to explore the drivers of productivity improvements.

The first is through matching a Black patient with a physician who has demonstrated high productivity specifically in treating Black patients. Previous literature has found evidence of large heterogeneity in physician quality (Currie and MacLeod, 2017; Gowrisankaran et al., 2023; Mourot, 2025). If BLM protests led to a better matching of high-productivity physicians with Black patients, this could help explain the observed reduction in mortality despite there having been no significant change in a hospital's resource use. The second pathway is through racial concordance, in which a Black patient might have been assigned a Black physician; some recent studies, such as Alsan et al. (2019), have found evidence that racial concordance leads to improved patient outcomes among Black patients.

Matching. To explore the first pathway, we construct an indicator for whether a Black patient was matched with a high-productivity attending physician. We focus on attending physicians because they make the key clinical decisions and are ultimately responsible for patient outcomes.[23] We define a Black-specific, high-productivity physician based on their average risk- and input-adjusted mortality for Black patients in the years prior to any BLM protests. Specifically, we calculate a risk- and input-adjusted mortality rate for each Black patient admitted before 2013, defined as the difference between the observed mortality indicator and the expected mortality

[22] Additionally, due to the small number of Black patients in some hospitals, the TFP may be estimated with error. To address this, we also apply an empirical Bayes shrinkage procedure to adjust the estimated $ln(A_{ht})$ for the measurement error following Chandra et al. (2016a). The results are robust across all specifications.

[23] We choose attending physician instead of surgeon because not all heart attack patients receive care from a surgeon unless a procedure is performed.

given the patient's characteristics and care input (measured by DRG weights). We then aggregate these patient-level adjusted mortality rates to the physician level. High-productivity physicians are defined as those whose Black-specific, ex-ante risk- and input-adjusted mortality rates fall below the hospital-specific 75th percentile.

First, as shown in panel (a) of Figure 9, we find that following BLM protests, Black patients are 5.8% more likely to be assigned to a Black-specific, high-productivity attending physician. Such improved matching is non-trivial, given a baseline matching rate of 64%. Meanwhile, when physician productivity is defined based on overall performance across all racial groups, we still find a significant improvement in the matching of Black patients to uniformly high-performing physicians. These results do not necessarily imply prior discriminatory intent by providers, however: before the protests, Black and non-Black patients experienced similar rates of matching to high-productivity physicians (64% vs. 66%; p = 0.53) in our sample.

[Figure 9 about here]

To quantify how much this pathway contributes to productivity gains, we estimate the pre-post version of Equation (6), including an indicator for matches with a high-productivity attending physician. We then compare the estimated treatment effect, β', to the baseline estimate, β, which does not control for the high-productivity physician indicator. The resulting change in the treatment effect, $\beta' - \beta$, represents the portion of the mortality reduction that can be explained by improvements in patient-physician matching.[24] Based on this calculation, we conclude that improved matching between Black patients and those physicians with high productivity in treating Black patients accounts for 1.0 percentage points ($= -0.018-(-0.028)$), or approximately one-third of the estimated reduction in patient mortality.

A natural question is whether the matching quality for non-Black heart attack patients declined following the improvement in Black patients' physician assignment. Appendix Figure E1 shows that, overall, non-Black patients were not assigned to lower-productivity attending physicians, regardless of whether physician productivity is defined based on performance with Black or non-Black patients. Appendix Figure E2 further shows that in hospital-years with a high share of Black patients, the probability of assigning a non-Black patient to a high-productivity physician decreased modestly only in the event year (year 0).

Because non-Black patients' matching patterns were stable and their health outcomes did not deteriorate, the improvements in matching for Black patients appear not to have pushed physicians to the limits of their capacity. This is plausible, given that Black patients constitute less than 20% of total patient volume. Moreover, the lack of significant mortality changes among non-Black racial groups, despite slight declines in matching with high-productivity physicians in hospital-years with a high share of Balck patients, suggests that prior allocation of high-productivity physicians may have exceeded what was necessary to sustain favorable outcomes for non-Black patients.

[24] Mechanically, the mortality reduction attributable to better patient–physician matching, $(\beta' - \beta)$, is equivalent to the product of the protest's effect on the likelihood of being matched with a high-productivity physician and the mortality impact of being treated by such a physician.

Racial Concordance. Even with comparable resource use, racially concordant physicians may achieve better outcomes through improved communication, which can lead to clinical decisions that are more appropriate, though similarly intensive, and to greater adherence to medical advice. Therefore, we construct an indicator of racial concordance if a Black patient was assigned to a Black physician.

Although we directly observe patients' race in the Medicare claims data, physicians' race and ethnicity are not recorded. To address this missing information, we use a name-based algorithm that infers a physician's race from their first and last names.[25] The algorithm returns race-specific probabilities for each name, and we apply cutoffs calibrated so that the overall racial distribution aligns with that reported by the American Medical Association (AMA) for physicians specializing in cardiovascular disease.[26]

The results are reported in panel (b) of Figure 9, where we find no evidence of an increase in racial concordance between patients and physicians following the BLM protests. This might be due to limited capacity and scarcity of Black physicians, who, according to the AMA, only account for 3% of the labor force for the specialty of cardiology.

7 Conclusion

This paper leverages the staggered onset of BLM protests across U.S. cities to examine the role of race-specific provider performance in shaping racial disparities in healthcare. We hypothesize that if provider performance varies by patient race, exposure to BLM protests—which center on the well-being of the Black population—could raise providers' racial awareness and societal accountability, thereby leading to improved quality of care for Black patients. Consistent with this hypothesis, we find that hospitals improve survival outcomes only for Black patients following local BLM protests, which suggests that provider performance is race-specific, malleable, and potentially an important lever for reducing racial disparities in healthcare. We also show that these gains are driven by enhanced provider productivity in treating Black patients, rather than increased resource use. A meaningful share of this productivity gain arises from assigning Black patients to attending physicians who are particularly effective in treating Black patients.

Our findings carry important policy implications. First, given that in response to heightened racial awareness and societal pressure, hospitals improved survival outcomes for Black patients without compromising care for non-Black patients, our results highlight the potential of public discourse and provider education as scalable policy tools for reducing racial disparities in healthcare. Chandra et al. (2024) propose reallocating patients to higher-quality hospitals and increasing resources for hospitals that serve large Black populations. While these suggestions offer important insights, they may, in practice, be met with logistical and financial constraints. Our results sug-

[25] We adopt a machine learning algorithm built on a recurrent neural network architecture and trained using Florida's voter registration data. See Xie (2022) for details.

[26] https://www.aamc.org/data-reports/workforce/data/table-13-practice-specialty-males-race/ethnicity-2018

gest that improving provider performance within existing facilities, without patient reallocation or market-level targeting, could reach a broader set of hospitals that care for Black patients. Likewise, while the Institute of Medicine has advocated increasing the number of Black physicians to promote racial concordance (Nelson, 2002), only about 5% of active physicians identify as Black, a fact that constrains the scope of this approach.[27] In contrast, initiatives that improve provider performance through public engagement or physician education can leverage the existing, predominantly White workforce and do not depend on racial concordance.

Second, our findings suggest that improving race-specific provider productivity offers an alternative approach to existing policies aimed at reducing racial gaps in healthcare. For instance, prior research and related policy discussions have often emphasized disparities in treatment intensity, including less frequent stroke testing for Black patients (Philip and Ozkaya, 2024), higher rates of unnecessary C-sections among low-risk Black mothers (Corredor-Waldron et al., 2024), longer hospital wait times for Black patients (Singh and Venkataramani, 2022), and lower rates of aggressive interventions for Black heart attack patients (Chandra and Staiger, 2010). In contrast, our evidence points to productivity as the key mechanism driving improvements in Black patients' health outcomes. Based on the evidence, one promising pathway for addressing health disparities is by improving the matching of Black patients with physicians who demonstrate high productivity in treating them.

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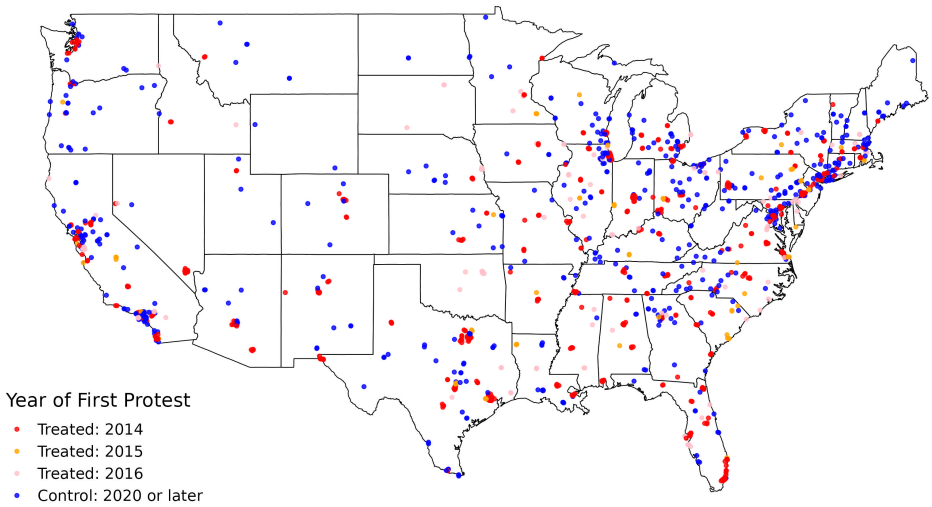
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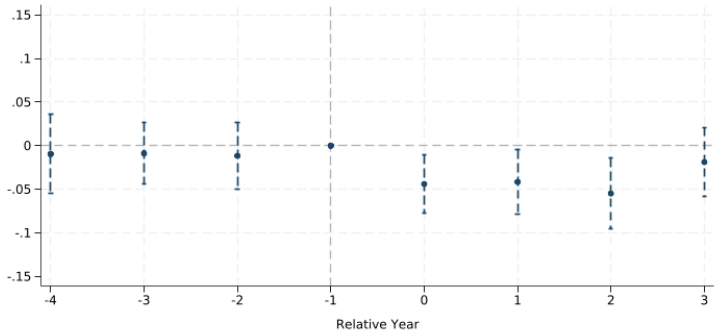
Figures

Figure 1: Hospitals Exposed to BLM Protests

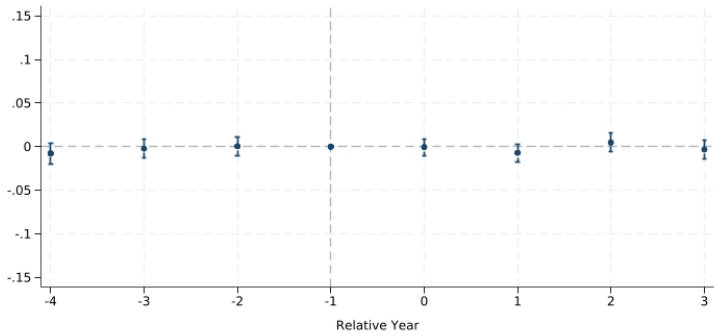


Notes: Each dot in the map represents a hospital. Hospitals that experienced their first BLM protest in 2014, 2015, or 2016 are assigned to the treated group in the corresponding cohort and are shown as red, yellow, and pink dots, respectively. Blue dots indicate hospitals that did not experience a protest until 2020 but eventually did by 2021; these serve as the control group.

Figure 2: Effect of BLM Protests on Hospital RAMR



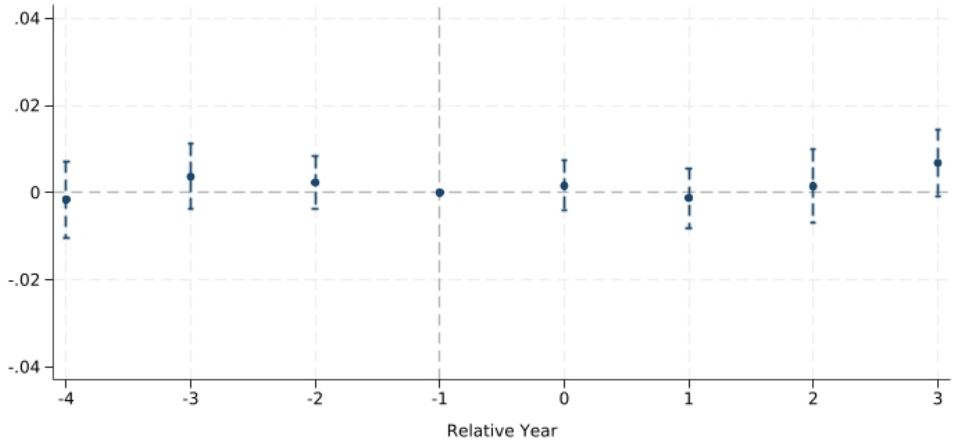
(a) Black Patients



(b) Non-Black Patients

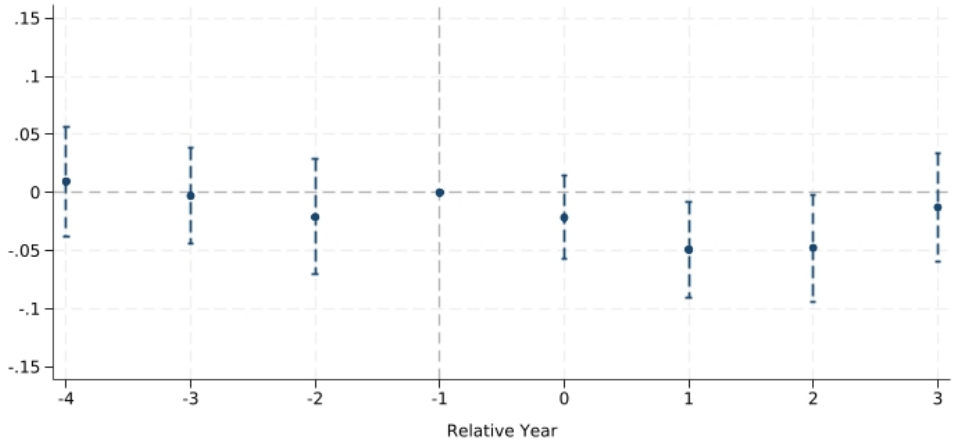
Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black (Panel (a)) and Non-Black (Panel (b)) heart attack patients, based on Equation (5), with 95 percent confidence intervals. Effects are normalized to the year prior to the protests. Standard errors are clustered at the hospital level.

Figure 3: Effect of BLM Protests on Hospital-Level Black Patient Severity



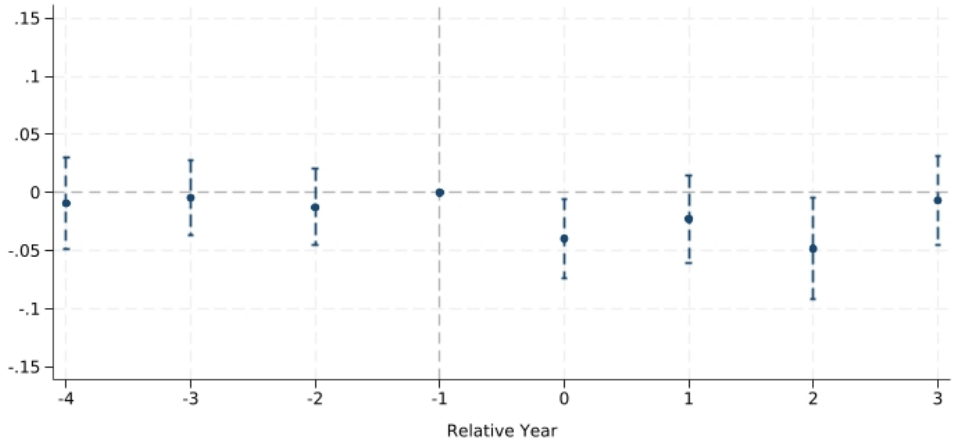
Notes: The figure plots the estimated treatment effects of BLM protests on a hospital's expected mortality rate for Black patients (EMR^{B}_{htc} as defined in Equation (2)), which serves as a measure of overall patient severity in a hospital, based on Equation (5), with 95 percent confidence intervals. Standard errors are clustered at the hospital level.

Figure 4: Effect of BLM Protests on Hospital RAMR for ED Black Patients



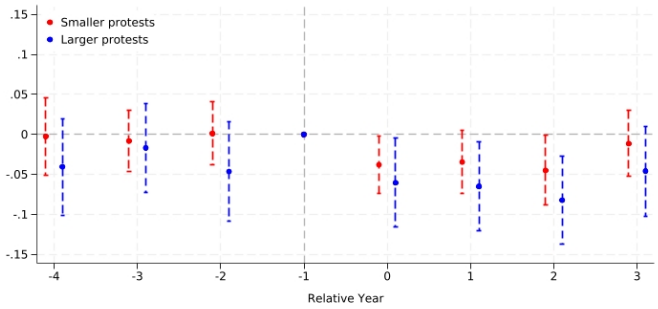
Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black patients admitted through the Emergency Department, based on Equation (5), with 95 percent confidence intervals. Standard errors are clustered at the hospital level.

Figure 5: Effect of BLM Protests on Patient-level Mortality of Non-exposed Black Patients

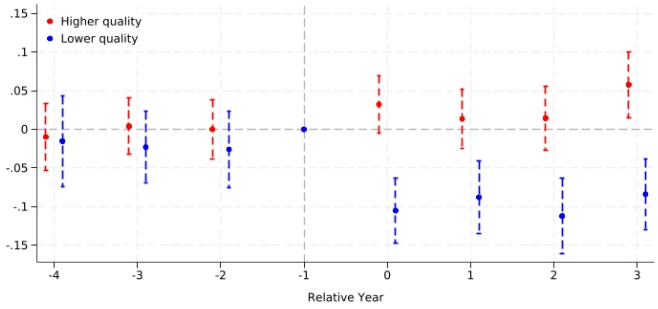


Notes: The figure plots the estimated treatment effects of BLM protests on patient level risk-adjusted mortality rates for Black patients who were admitted to the exposed hospitals *before* any protests occurred in their home cities, based on Equation (6), with 95 percent confidence intervals. Standard errors are clustered at the hospital level.

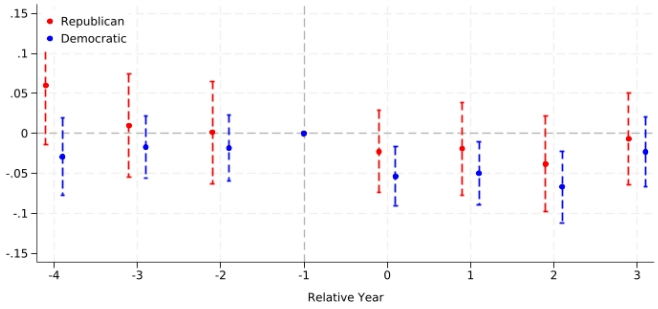
Figure 6: Heterogeneous Effects of BLM Protests on Black Patients' RAMR



(a) By Protest Size



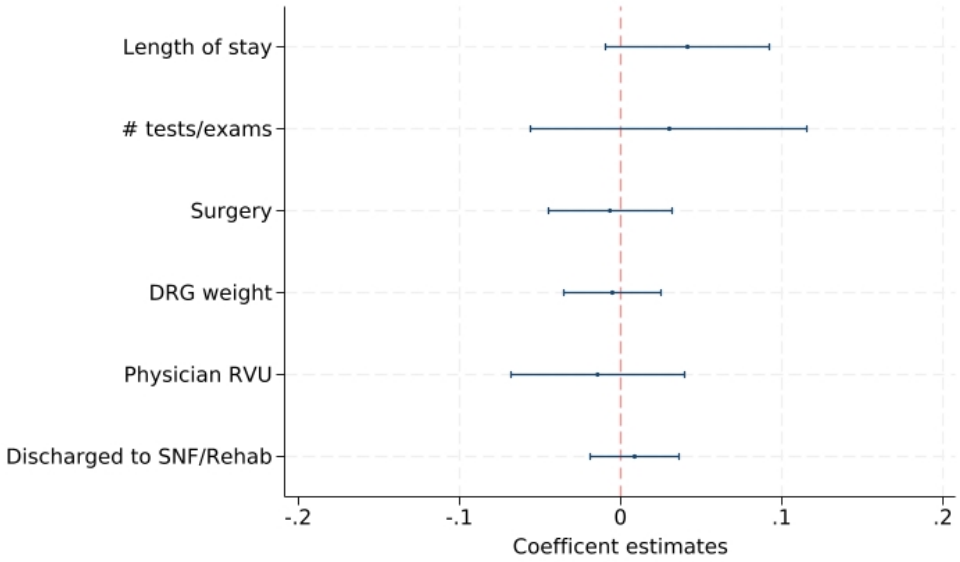
(b) By Hospital Ex-ante Quality



(c) By Political Ideology

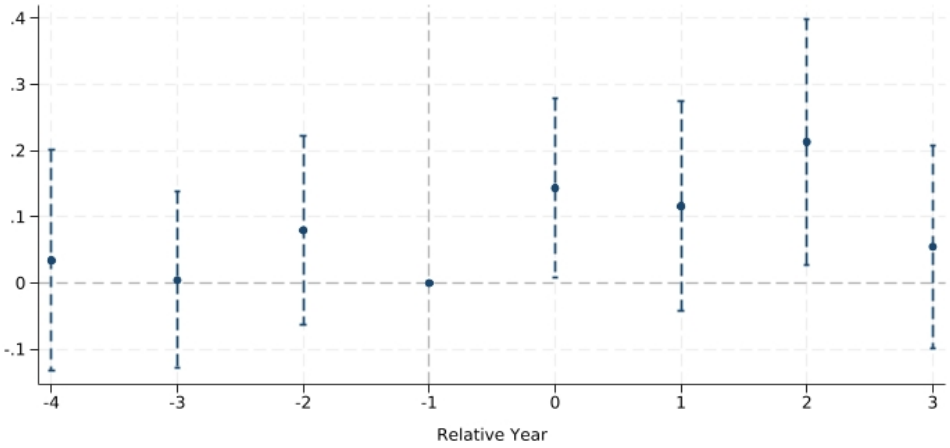
Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black heart attack patients by protest size (panel (a)), hospital ex-ante quality for Black patients (panel (b)), and county political ideology (panel (c)), based on Equation (5), with 95 percent confidence intervals. Each treated group is compared to a common control group: hospitals exposed to protests only in 2020 or later. Standard errors are clustered at the hospital level.

Figure 7: Changes in Care Resource Utilization for Black Patients



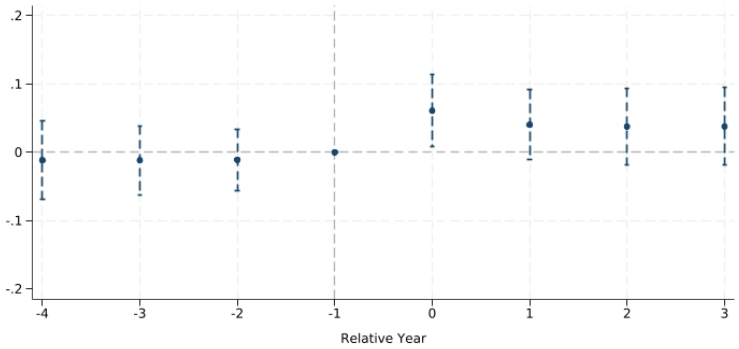
Notes: The figure plots the estimated treatment effects of BLM protests on measures of individual Black patients' care intensity and resource use, based on a pre-post version of Equation (6), with 95 percent confidence intervals. Specifically, the relative year dummies in Equation (6) are replaced with a single post-period indicator. Standard errors are clustered at the hospital level.

Figure 8: Changes in Hospitals' Total Factor Productivity for Black Patients

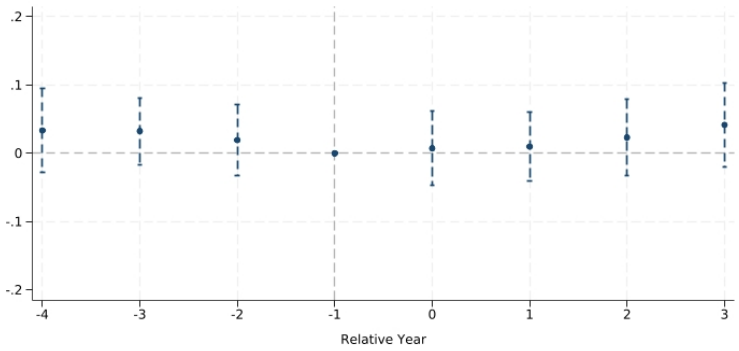


Notes: The figure plots the estimated treatment effects of BLM protests on hospitals' Black-specific TFP, based on Equation (5), with 95 percent confidence intervals. Hospital TFP is estimated using a patient-level health production function as specified in Equation (7), following the methodology of Chandra et al. (2016a,b). Standard errors are clustered at the hospital level.

Figure 9: Effect of BLM Protests on Patient-Physician Matching



(a) Assigning Black Patients to High-Productivity Physicians



(b) Assigning Black Patients to Black Physicians

Notes: The figure plots the estimated treatment effects of BLM protests on a Black patient's likelihood of being matched with a Black-specific high-productivity physician (panel (a)) and with a Black physician (panel (b)), based on Equation (6), with 95 percent confidence intervals. Effects are normalized to the year prior to the protests, and standard errors are clustered at the hospital level.

Tables

Table 1: Summary Statistics by Hospital Treatment Status

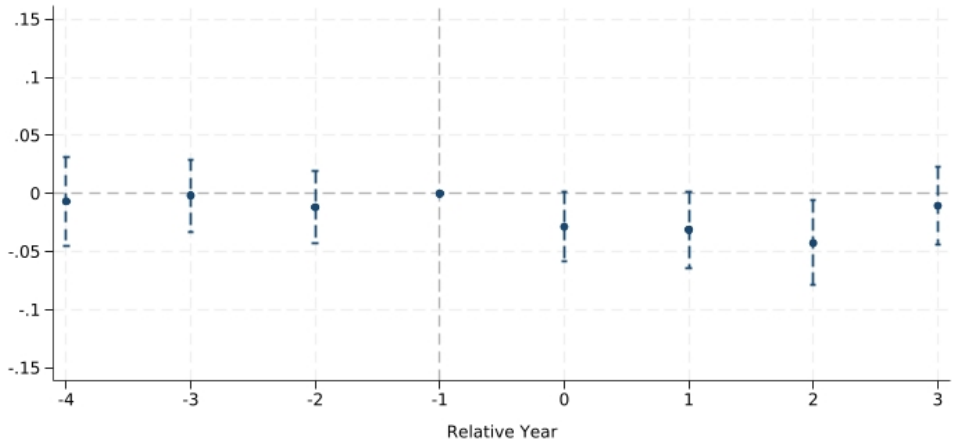
	All Hospitals	Treated Hospitals	Control Hospitals
Health Outcome			
30-day RAMR	0.10	0.10	0.09
	(0.17)	(0.17)	(0.17)
Care Utilization			
Length of stay	5.49	5.63	5.31
	(3.26)	(3.24)	(3.28)
Number of tests/exams	5.08	5.16	4.98
	(3.91)	(3.92)	(3.90)
Surgery rate	0.43	0.42	0.44
	(0.29)	(0.28)	(0.30)
DRG weights	2.24	2.31	2.15
	(1.07)	(1.07)	(1.05)
Relative value unit	5.45	5.32	5.62
	(4.74)	(4.66)	(4.83)
Hospital Characteristics			
Log(available bed)	5.80	5.95	5.61
	(0.58)	(0.60)	(0.50)
Log(total admission)	10.37	10.48	10.24
	(0.57)	(0.59)	(0.51)
Teaching hospital	0.67	0.78	0.53
	(0.47)	(0.42)	(0.50)
Private non-profit hospital	0.73	0.71	0.74
	(0.45)	(0.45)	(0.44)
Medicaid patient ratio	0.12	0.13	0.10
	(0.10)	(0.11)	(0.09)
Medicare patient ratio	0.32	0.29	0.34
	(0.10)	(0.11)	(0.10)
County Characteristics			
Log(median household income)	10.90	10.85	10.96
	(0.25)	(0.21)	(0.28)
Log(population)	13.31	13.58	12.96
	(1.20)	(1.15)	(1.16)
Unemployment rate	0.07	0.07	0.06
	(0.02)	(0.02)	(0.02)
Ratio: adult population	0.69	0.70	0.67
	(0.10)	(0.12)	(0.08)
Ratio: non-White population	0.31	0.35	0.26
	(0.14)	(0.14)	(0.12)
Ratio: with bachelor degree or above	0.31	0.33	0.30
	(0.10)	(0.09)	(0.11)
Observations	5,069	2,860	2,209

Notes: Means are reported with standard errors in parentheses. The unit of observation is hospital-years with more than one Black patient.

Appendix

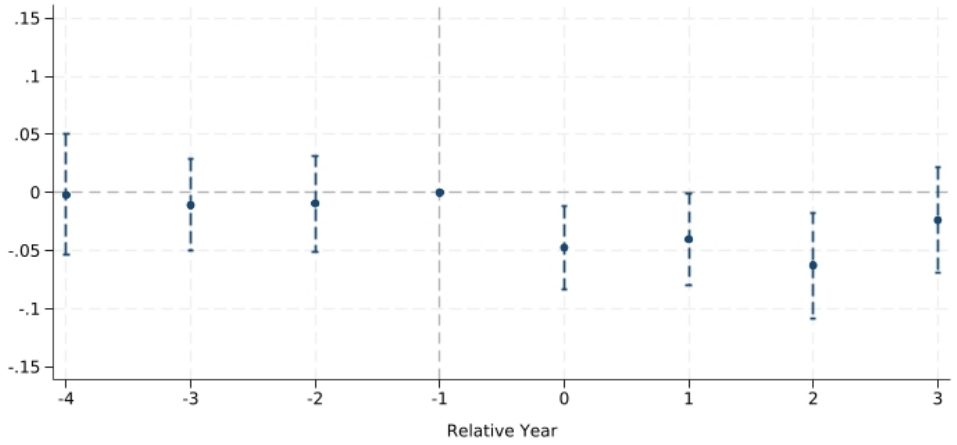
A Robustness Checks on Mortality Reductions for Black Patients

Figure A1: Effect of BLM Protests on Patient-Level Mortality for Black Patients



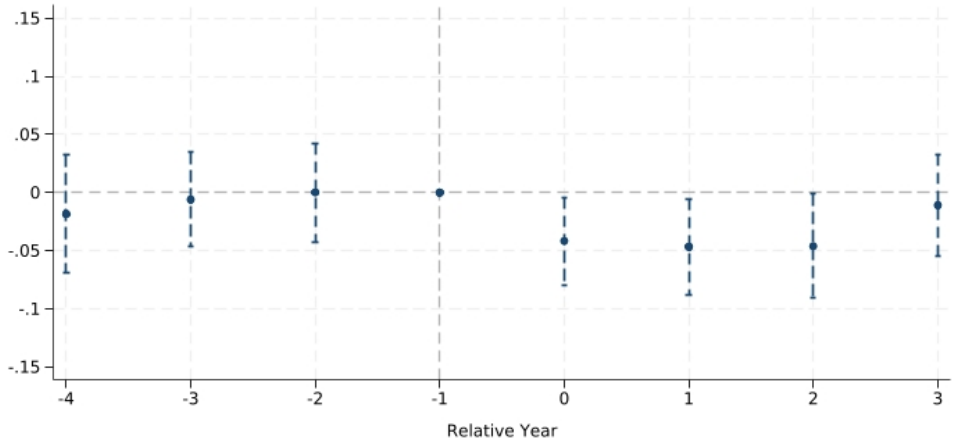
Notes: The figure plots the estimated treatment effects of BLM protests on patient level mortality for Black heart attack patients, based on Equation (6). Effects are normalized to the year prior to the protests. Standard errors are clustered at the hospital level.

Figure A2: Effect of BLM Protests on Hospital RAMR for Black Patients: Including State-by-year FE



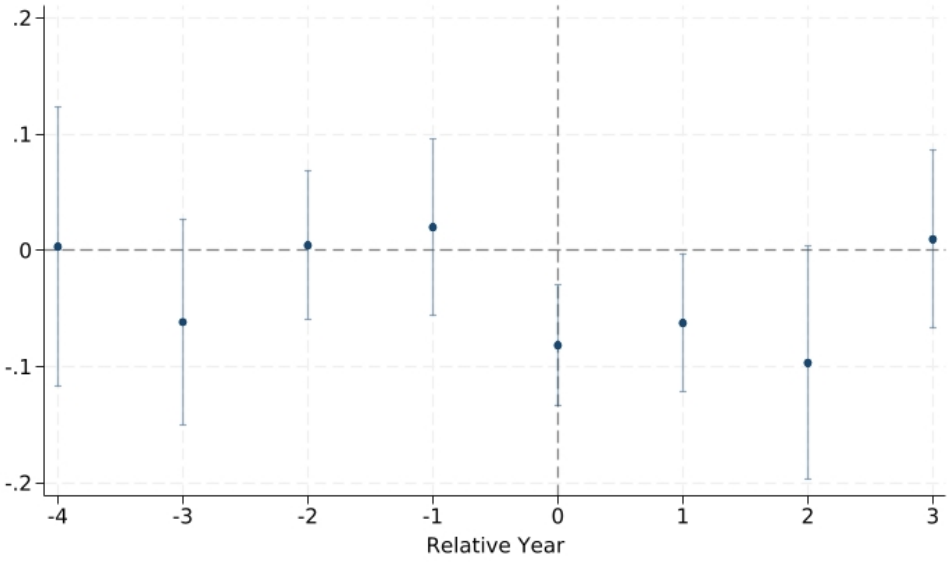
Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black heart attack patients, based on Equation (5) plus state-by-year fixed effects. Effects are normalized to the year prior to the protests. Standard errors are clustered at the hospital level.

Figure A3: Effect of BLM Protests on Hospital RAMR for Black Patients: Dropping Large Cities



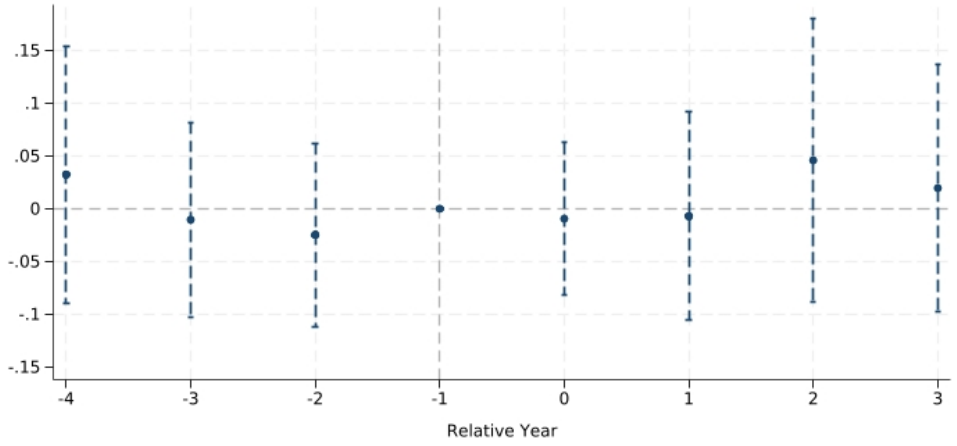
Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black heart attack patients, based on Equation (5), excluding samples located in cities with above-median population. Effects are normalized to the year prior to the protests. Standard errors are clustered at the hospital level.

Figure A4: Effect of BLM Protests on Hospital RAMR for Black Patients: CSDID



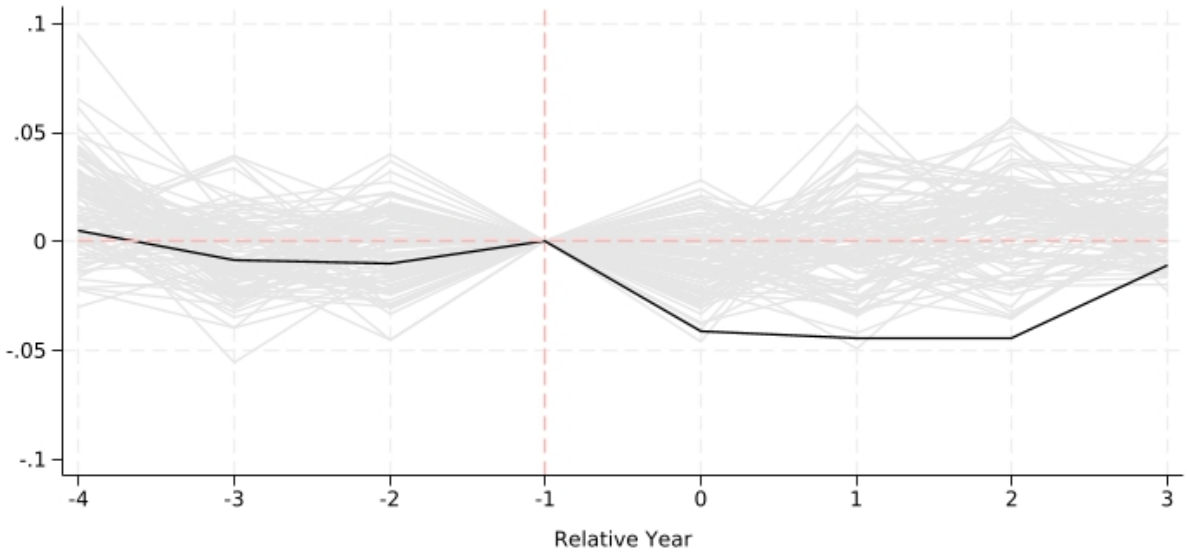
Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black heart attack patients using the alternative estimator proposed by Callaway and Sant'Anna (2021).

Figure A5: Placebo Treatment Effect on Hospital RAMR for Black Patients



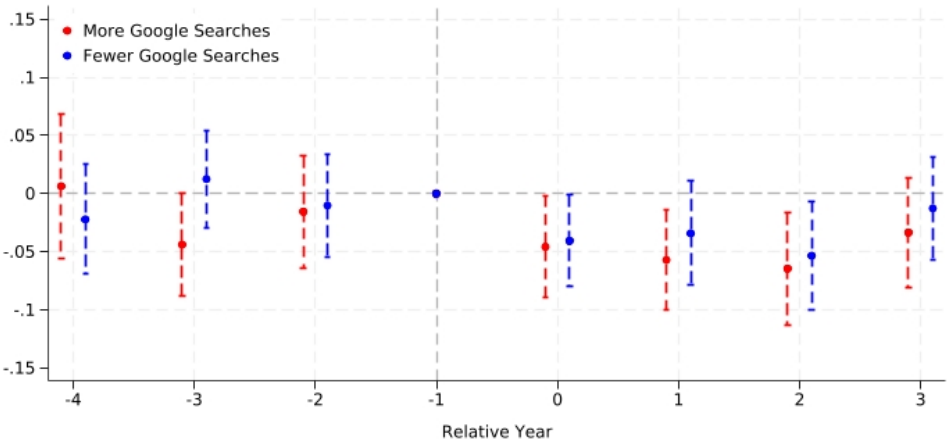
Notes: The figure plots the placebo treatment effects on hospital risk-adjusted mortality rates for Black heart attack patients, estimated from Equation (5) using matched placebo-treated control hospitals.

Figure A6: Placebo Treatment Effects from the Permutation Test



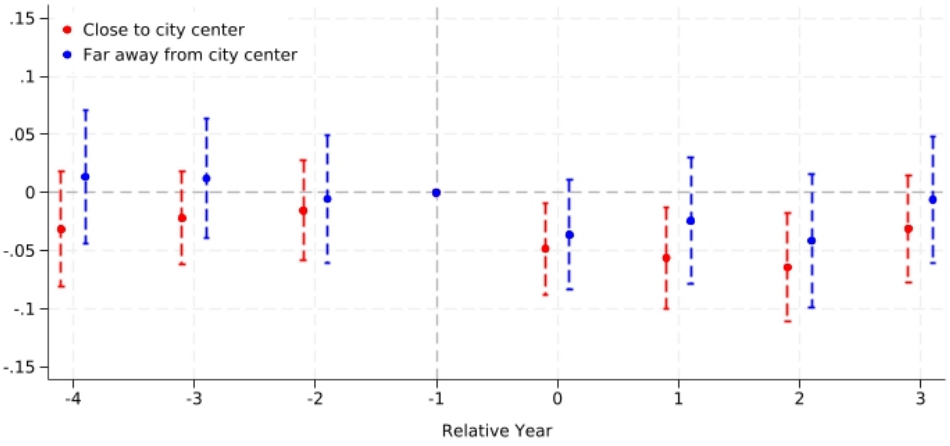
Notes: This figure plots the event-study placebo treatment effects based on Equation (5), with the black solid line indicating the "true" treatment effect.

Figure A7: Heterogeneous Effects on Black Patients' RAMR by Google Search Trend



Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black heart attack patients, split by Designated Market Area level Google search intensity for "Black Lives Matter" or "BLM," using the median intensity as the cutoff.

Figure A8: Heterogeneous Effects on Black Patients' RAMR by Distance to City Center

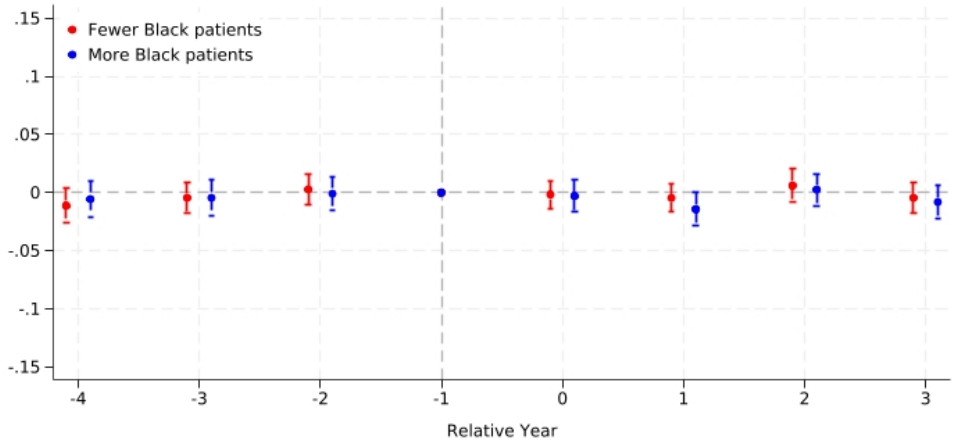


Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for Black heart attack patients, split by hospitals' distance from the city center, where protests most likely occurred, using the median distance as the cutoff.

B The Effect of BLM Protests on Non-Black Patients by Hospital-Year's Share of Black Patients

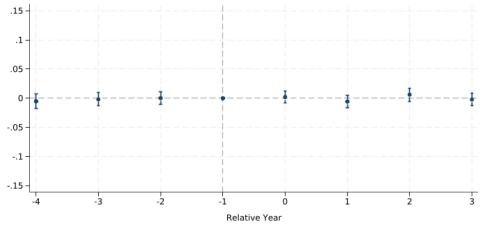
To define hospital-years with a high share of Black patients, we use data from all treated hospitals in 2013 and earlier to construct the distribution of hospital-level Black patient shares and set the threshold at the pre-2014 median. Treated hospital-year observations with a Black patient share above this threshold are classified as high-share. The control group is the same as the main analysis. We take this approach instead of classifying hospitals permanently into high or low share group because a hospital's racial composition may vary from year to year, and what matters for our analysis is whether, in a given year, the hospital had a relatively high share of Black patients, and how that may influence outcomes for Non-Black patients.

Figure B1: Effect of BLM protests on Hospital RAMR for Non-Black Patients

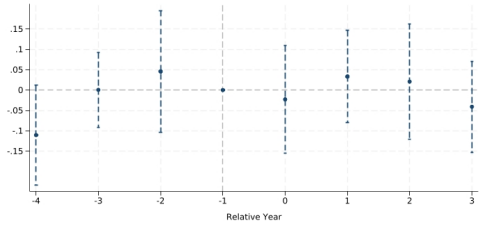


C The Effect of BLM Protests on White, Asian, and Hispanic Patients

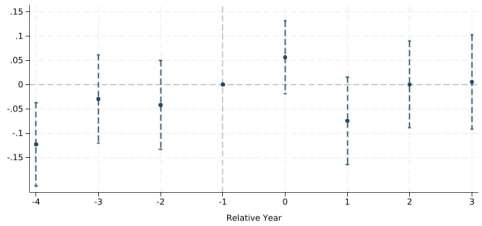
Figure C1: Effect of BLM Protests on Hospital RAMR



(a) White Patients



(b) Asian Patients



(c) Hispanic Patients

Notes: The figure plots the estimated treatment effects of BLM protests on hospital risk-adjusted mortality rates for White (panel (a)), Asian (panel (b)), and Hispanic (panel (c)) heart attack patients, based on Equation (5), with 95 percent confidence intervals. Standard errors are clustered at the hospital level.

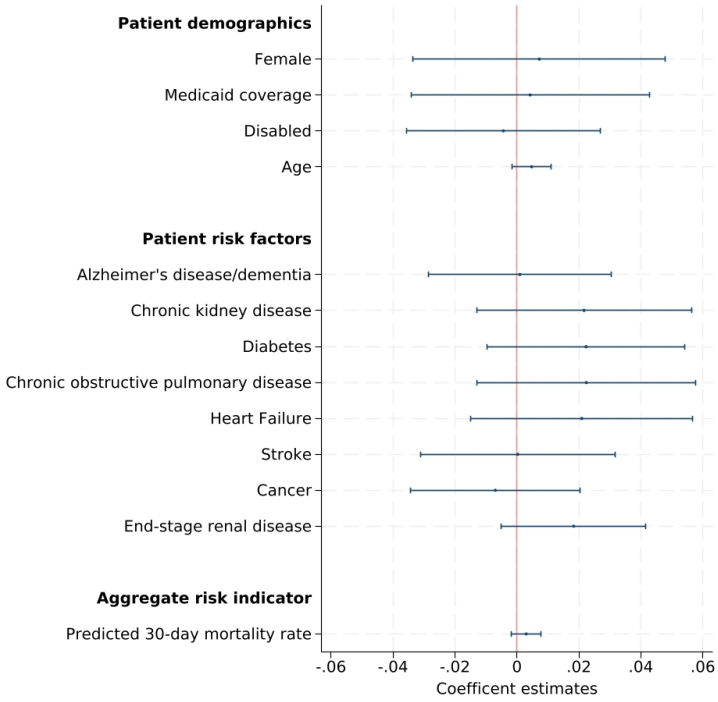
D Patient Selection

We present a pre-post patient-level event study examining whether observed patient characteristics respond to BLM protests. Had patient selection occurred, we would expect shifts in patient demographics and risk factors following BLM protests.

$$Y_{ihtc} = \beta \times Treated_{hc} \times \mathbf{1}(t \geq 0) + \delta_{tc} + \theta_{hc} + \phi_t^m + \phi_t^d + \epsilon_{ihtc}. \tag{D1}$$

We estimate Equation (D1) using patient characteristics as outcomes, restricting the sample to Black patients. As shown in Figure D1, these characteristics remain balanced after protests, providing no evidence of selection on observables.

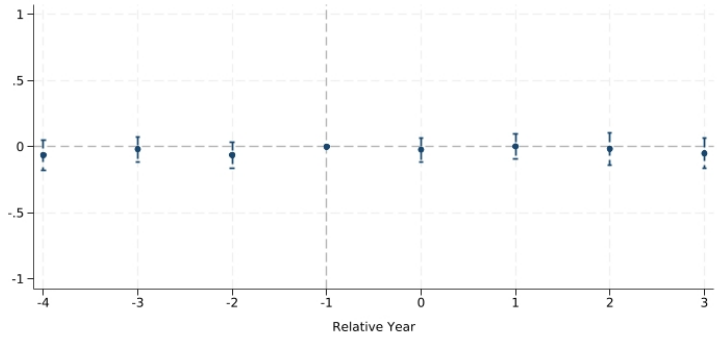
Figure D1: Balance Check on Patient Characteristics



Notes: The figure plots the estimated treatment effects of BLM protests on various Black patients' demographics and risk factors, based on Equation (D1), with 95 percent confidence intervals. The predicted 30-day mortality rate is the fitted value from Equation (1), denoted as $\hat{p}_{ih}$. Standard errors are clustered at the hospital level.

We also examine whether the volume of Black patients changed following BLM protests. We estimate a Poisson pseudo–maximum likelihood model; results are similar under a linear specification.

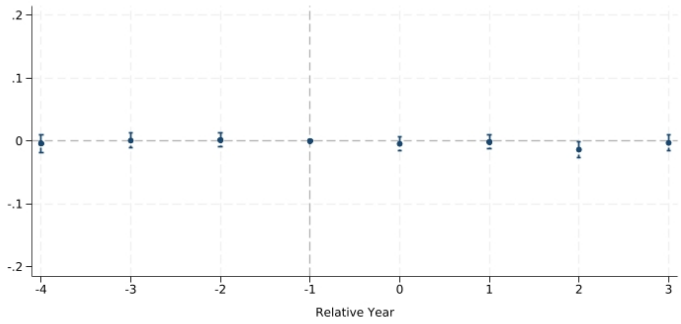
Figure D2: Treatment Effect on Black Patient Volume



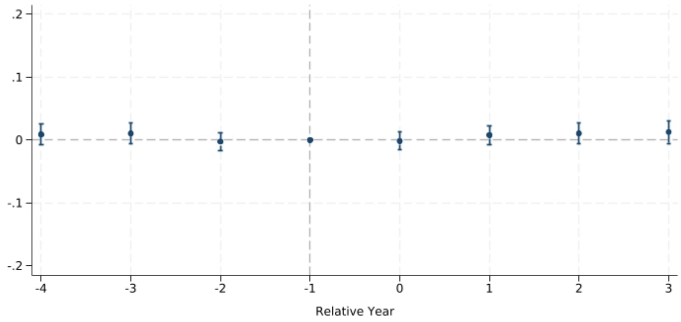
Notes: The figure plots the estimated treatment effects of BLM protests on Black patient volume, based on Poisson pseudo–maximum likelihood. Standard errors are clustered at the hospital level.

E Matching Between Non-Black Patients and High-Productivity Physicians

Figure E1: Assigning Non-Black Patients to High-Productivity Physicians



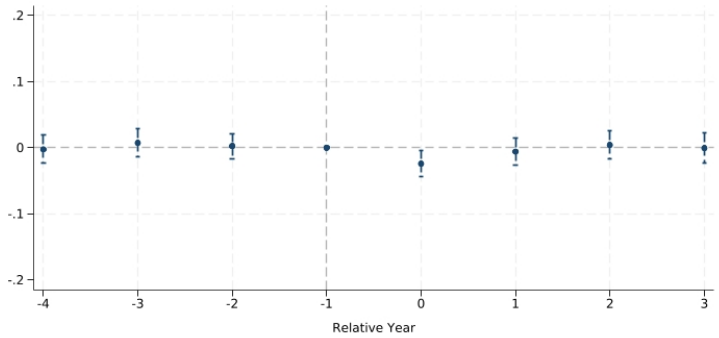
(a) High-Productivity Physicians in Treating Black Patients



(b) High-Productivity Physicians in Treating Non-Black Patients

Notes: The figure plots the estimated treatment effects of BLM protests on a non-Black patient's likelihood of being matched with a high-productivity physician, based on Equation (6), with 95 percent confidence intervals. Panel (a) defines physician productivity based on performance with Black patients, while Panel (b) uses performance with non-Black patients. Effects are normalized to the year prior to the protests, and standard errors are clustered at the hospital level.

Figure E2: Assigning Non-Black Patients to High-Productivity Physicians in High Black-Share Hospitals



Notes: The figure plots the estimated treatment effects of BLM protests on a non-Black patient's likelihood of being matched with a high-productivity physician, focusing on hospital-years with an above-median share of Black patients. Physician productivity is measured based on performance with non-Black patients. Effects are normalized to the year prior to the protests, and standard errors are clustered at the hospital level.